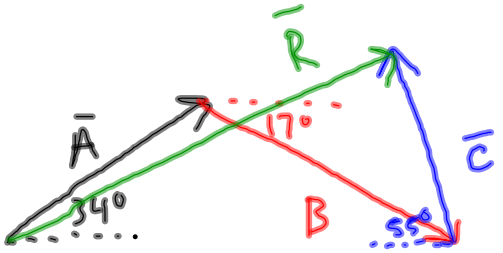
Vector Problem Types:

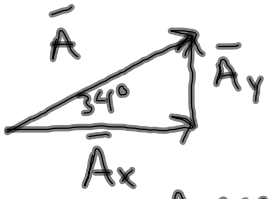
1. Resultant/Components
2. Hanging Object
3. River
4. Rope pulling on a horizontal surface
5. Inclined plane

TEST Monday

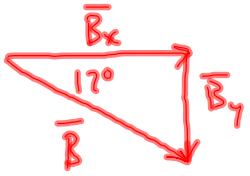
Vector Notes and Practice Problems 3.26.12 CP Physics

Add the following vectors graphically and algebraically: 10 N at 34 degrees North of East, 15 N at 17 degrees South of East, and 12 N at 55 degrees North of West.



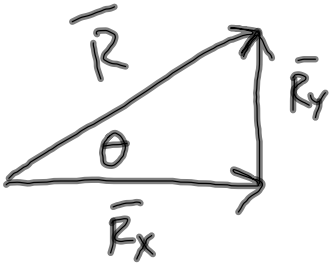


$A\cos(34°)$



$A_x = +8.29$
$B_x = +14.34$
$+ C_x = -6.88$
$R_x = 15.75$

$A_y = +5.59$
$B_y = -4.39$
$+ C_y = +9.83$
$R_y = 11.03$

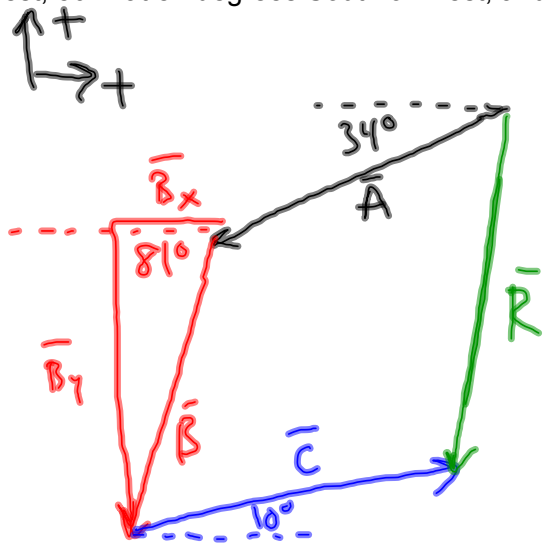


$R = 19.23\ N$ from Pythagorean theorem

$\theta = 35°$ using $\tan^{-1}$

$\bar{R} = 19.23\ N @ 35°$ N of E

Add the following vectors graphically and algebraically: 44 N at 34 degrees South of West, 50 N at 81 degrees South of West, and 40 N at 10 degrees North of East.

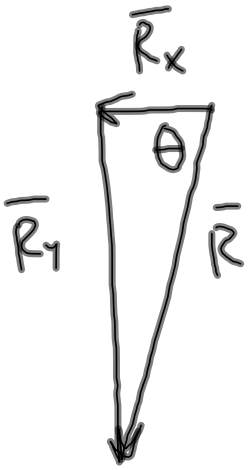


$A_x = -36.4\ N$ $\quad A_y = -24.6\ N$

$B_x = -7.82\ N$ $\quad B_y = -49.38\ N$

$+C_x = +39.39\ N$ $\quad C_y = +6.8\ N$

$R_x = -4.91\ N$ $\quad R_y = -67.03\ N$



$R = 67.21\ N$

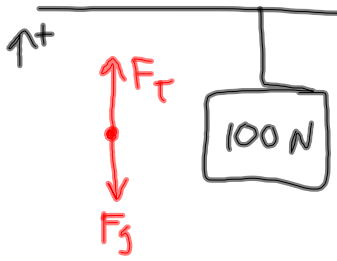
$\theta = 85.8°$

S of W

$\bar{R} = 67.2\ N$ @ $85.8°$ S of W

Hanging Objects:

*NO acceleration

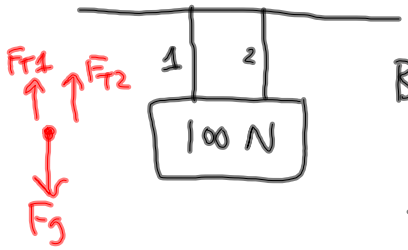


$\Sigma F = \emptyset$

$F_T - F_g = \emptyset$

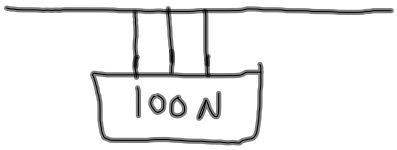
$F_T = F_g$

$= 100\ N$



Both hanging vertically, so have the same tension.

$F_{T1} = F_{T2} = 50\ N$



Tension divided equally among all of them, so each tension = 33.3 N

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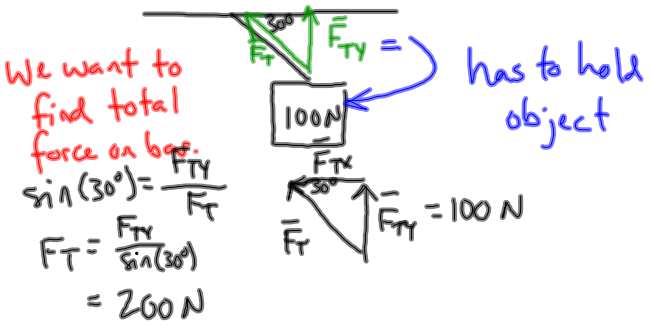
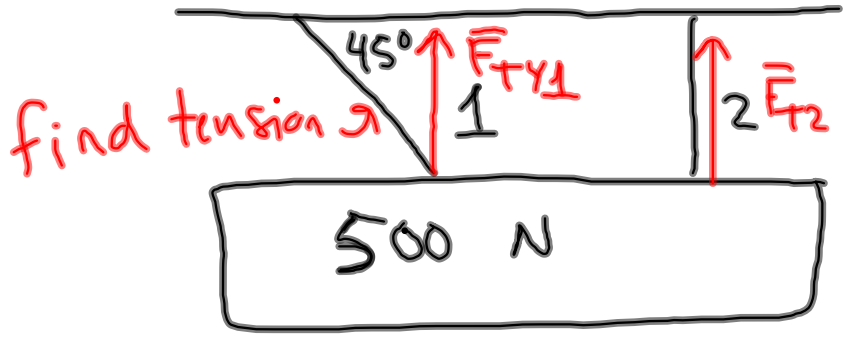
* We are now using rigid metal bars so that the object doesn't move.



$\sin(30°) = \frac{F_{TY}}{F_T}$

$F_T = \frac{F_{TY}}{\sin(30°)}$

$= 200\ N$

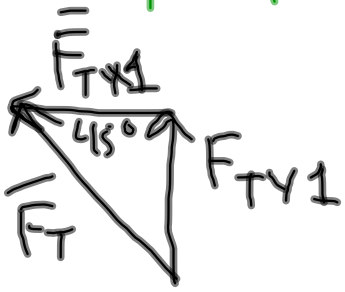


find tension ↗

Two steps to this:

$$F_{TY1} = F_{T2} = 250\,N$$

* Y-components add together to be equal to the weight



$$\sin(45°) = \frac{F_{TY1}}{F_{T1}}$$

$$F_T = \frac{F_{TY1}}{\sin(45°)}$$

$$= 353.6\,N$$